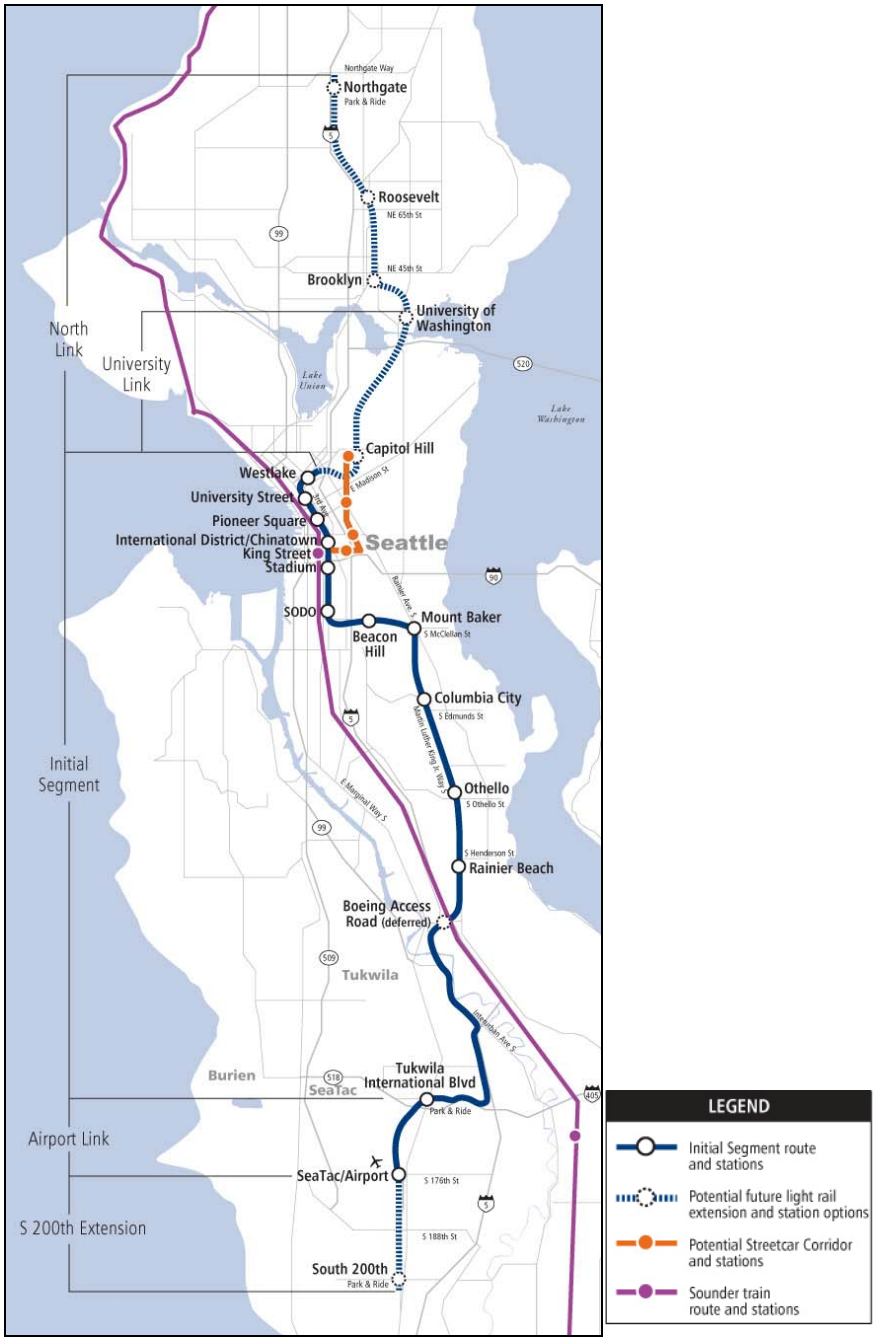
First Hill Transit Connector Alternatives
Summary Report



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Background

On January 26, 2006, the Sound Transit Board approved Motion M2006-13, which authorized staff to proceed with the second phase of the First Hill Work Program – technical work on potential First Hill transit connector (streetcar and bus) improvements in the Broadway and Madison corridors. This effort included conceptual engineering (five percent design completion), preparation of cost estimates, and consideration of environmental issues. The purpose of the study was to further evaluate the feasibility of improved regional transit access to the First Hill area. The Motion also confirmed that no further work would be advanced on the previous First Hill light rail station or alternative light rail station sites.

Sound Transit staff, in cooperation with City of Seattle and King County Metro staff, and with the support of the ST2 engineering design team, has completed the First Hill Work Program. This document summarizes the results, public involvement in the process, and presents information on the relative benefits of streetcars and bus transit.

The technical work summarized in this report is the basis for Sound Transit Board consideration of the First Hill Streetcar Project as a candidate ST2 project.

Conclusions

Several conclusions can be drawn from the technical evaluation work done to date on the First Hill Transit Connector alternatives. These conclusions are based on information further explained in this summary report and include the following:

- A streetcar line is a feasible alternative in the Jackson/Broadway Corridor.
- Modest bus service improvements in the Madison corridor are achievable.
- There is a direct tradeoff between providing priority to transit using right-turn and bus only lanes and on-street parking loss; substantially better performance and likely also more economic development benefits would occur with transit priority.
- Ridership is highest with the streetcar alternative in the Jackson/Broadway Corridor.
- More engineering and environmental work is needed but the cost estimate range is sufficient to represent likely project costs.
- Further work in preliminary engineering will address improving operational speeds, etc.
- Sound Transit's outreach effort during the evaluation process found widespread support for improved transit, and strong public interest in development of a streetcar line to First Hill.
- While both streetcar and bus alternatives share some benefits including improved regional connections and faster service with more limited stops, streetcar can be a catalyst for new development and provides other additional benefits that bus improvements alone generally do not provide.

Alternatives Considered

The First Hill Work Program analyzed alternatives in two separate corridors:

- International District / Chinatown Station (IDS) to Capitol Hill Station via First Hill (Jackson/Broadway Corridor) and
- Western Avenue to Broadway Avenue (Madison Corridor).

The corridors were identified by the preceding effort and technical advisory committee in fall 2005 as most promising for further study. The goal was to attract the highest ridership and serve major employers in the First Hill and 12th Avenue urban village sectors of the designated regional growth center formerly served by the planned First Hill light rail station.

In the Jackson/Broadway Corridor two alternative modes were considered: a streetcar and bus transit improvements. Three variations in street alignment were considered from the corridor defined in fall 2005 for the streetcar alternative. Two were ruled out due to utility conflicts or steep grades, a third is considered feasible and could be re-evaluated, while a fourth variation via Madison Street was later suggested that would have greater property and traffic impacts than the alternative selected for this study. In the Madison Corridor, only bus transit improvements were considered. Five options were first developed for the Madison Corridor and then narrowed to two by a collaborative review process. Definition of all alternatives carried forward for conceptual design and impact evaluation was also a product of substantial work in committee; people representing King County Metro, Seattle Department of Transportation and Sound Transit participated in study screening efforts contributing data and review time to all reports.

Conceptual design layouts and schematics for each alternative are included in the CD accompanying this summary report. Background information on all alternatives defined during screening is appended to the complete First Hill Study document.

Jackson/Broadway Corridor

Streetcar Alternative

The IDS to Capitol Hill Station streetcar alternative would follow an approximately 2.2-mile alignment via 5th Avenue South, South King Street/South Jackson Street, 12th Avenue South, Boren Avenue, and Broadway Avenue as shown in Figure 1. At the south end of the corridor, between IDS and 12th Avenue, the proposed alignment is based on one-way loop operations with the eastbound trackway on South King Street and the westbound trackway on South Jackson Street connected by a stop immediately adjacent to the existing IDS Station on 5th Avenue South. This alternative includes connecting tracks to the existing waterfront streetcar line and the new maintenance facility proposed by King County off South Main Street. Double-track operations on South Jackson Street and other route options on First Hill were also considered. Included in the design effort as a separate project, is an approximately 0.6 mile extension of the line from the Capitol Hill Station to East Aloha Street at the north end of the Capitol Hill business district.

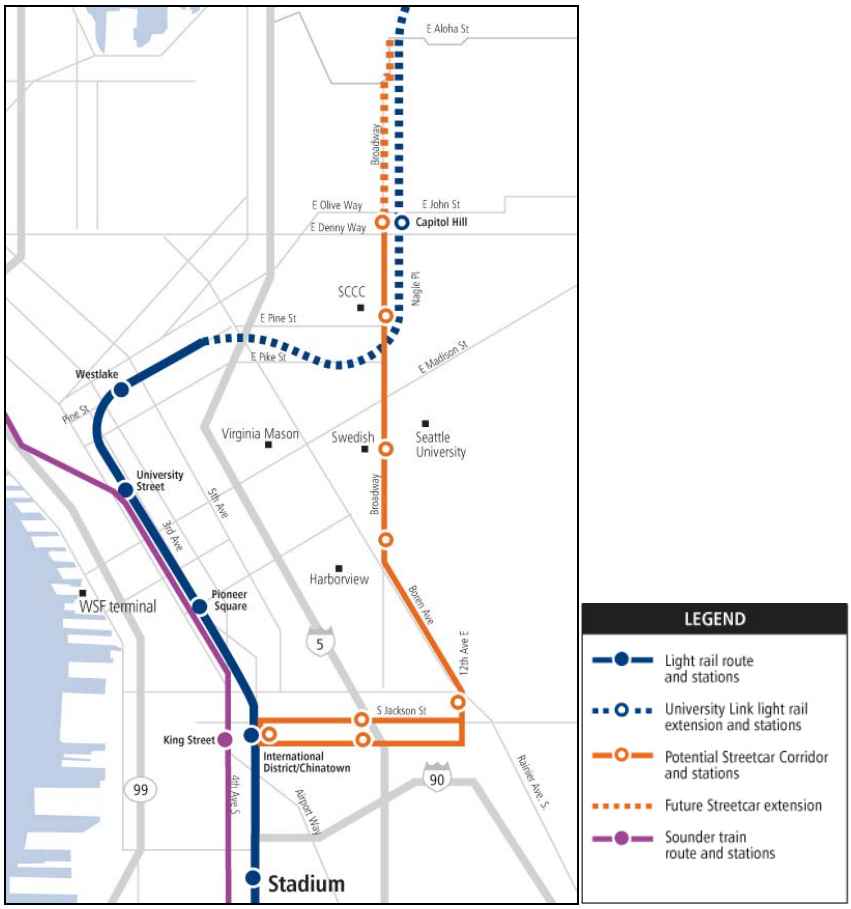
The streetcar alternative includes two short transit-only lanes, and two stretches of curbside Business Access Transit (BAT) lanes, which would displace most on-street parking in the following locations:

- North side of South Jackson Street between 5th Avenue South and 12th Avenue South,
- South side of South King Street between 8th Avenue South and 10th Avenue South,
- West side of Broadway Avenue between East Terrace Street and East James Street, and
- East side of Broadway Avenue between East Alder Street and East Olive Street.

The BAT lanes are not required to provide streetcar service but use of transit priority lanes delivers more travel time and reliability benefits. Operating streetcar service in mixed traffic is an alternative.

Streetcar service also requires development of a light maintenance facility for vehicles near the alignment. For purposes of this study, an approximately one-acre site located between Interstate 5, 10th Avenue South, South Jackson and South King Streets was identified. Conversion of land area under Interstate 5 was alternatively considered for this purpose, but design constraints including the sloping site, vertical clearance and location of freeway bridge piers led to elimination of this option.

Figure 1. Jackson/Broadway Streetcar Route



Bus Alternative

The IDS to Capitol Hill Station bus improvements alternative would follow the same alignment as the streetcar alternative, except that buses would not run on a one-way loop at the south end of the corridor. Instead, both eastbound and westbound buses would operate on South Jackson Street with a bus turnaround at 2nd Avenue South and South Jackson Street. This alternative is assumed to employ trolley buses using existing overhead wires.

The bus improvements alternative includes more extensive BAT lanes than the streetcar line because bus vehicles can pass during heavy congestion due to right turning vehicles. The BAT lanes would displace most on-street parking in the following locations:

- South Jackson Street between 4th Avenue South and 12th Avenue South,
- East side of Broadway Avenue between East Alder Street and East Olive Street, and
- West side of Broadway Avenue between East Olive Street and East Terrace Street.

In the Jackson/Broadway corridor, both the streetcar and bus improvements alternatives include new signals and transit signal priority or transit-only phases in the light cycles at a number of locations to improve system performance.

Madison Corridor

Bus Alternatives

Two bus improvement options were developed for Madison Street between Western Avenue and Broadway Avenue. Both options include removal of on-street parking all-day on Madison Street between 1st Avenue and Broadway Avenue and introduction of a new eastbound contraflow transit lane on Madison Street, which is currently one-way westbound in downtown between 1st Avenue and 6th Avenue.

In addition to the new contraflow transit lane on Madison Street, Option 1 would include a transit-only westbound curb lane on Madison Street between 1st Avenue and 6th Avenue. On First Hill the curb lanes would be converted to BAT lanes, for bus and right-turning general purpose traffic only. A transit-only signal phase would be provided at 9th Avenue for westbound buses to allow them either to merge to the left lane to avoid traffic queuing up in the approach to Interstate 5 on-ramps or to turn left onto southbound 9th Avenue. Some or all of the traffic signals between 7th Avenue and Broadway Avenue would be modified, providing additional green-time and/or transit signal priority to optimize east-west travel times.

Option 2 is the same as Option 1 in downtown Seattle except that the westbound curb lane on Madison Street between 1st Avenue and 6th Avenue would remain open to all traffic. On First Hill, the existing two-way center left-turn lane would be eliminated and left turns would not be permitted off Madison between 8th Avenue and Summit Avenue; allowing the four travel lanes and sidewalks to be widened. The left-turn traffic was redistributed to intersecting side streets in the Madison corridor in the base option; but removed from the study volumes under the "Optimized" alternative. The Optimized scenario is based on drivers choosing other approach routes or modes of travel, avoiding Madison to reach their destinations. Option 2 would include the same traffic signal changes as Option 1.

Evaluation Results

Ridership Forecasts and Travel Times

The operating plans used in forecasting ridership and estimating operations and maintenance costs for each of the First Hill transit alternatives are shown in Table 1.

Table 1: First Hill Transit Alternatives
Assumed Operating Plans[1]

	Headway (minutes)		Service Span	
Alternative	Peak	Off-Peak	Hours/Day	Days/Week
Broadway/Jackson Corridor Streetcar	10	10 to 15	20	7
Broadway Corridor Bus Improvements	10	10 to 15	16	7
Madison Corridor Bus Improvements	5 to 7	10 to 15	18	7

[1] Operating plans above are consistent with cost estimates. Bus service plan provided by King County.

Ridership forecasts were prepared using the Sound Transit ridership forecasting model. The forecasts are shown in Table 2. All forecasts are for 2030 and mode specific. Streetcar forecasts assume that Link light rail is operational from Northgate to Kent / Des Moines and east to Redmond/Overlake. Off-model forecasts were also generated to further validate bus ridership.

Table 2: First Hill Transit Alternatives
2030 Daily Ridership Forecast

Alternative	Daily Ridership
Broadway/Jackson Streetcar	3,000 to 3,500
Broadway/Jackson Streetcar Extension[1]	500
Broadway/Jackson Bus Improvements	2,000
Madison Corridor Bus Improvements[2]	500

[1] The streetcar extension to Aloha Street is forecast to add 500 daily riders to the base; up to 4,000 total daily riders.

[2] The Madison Corridor improvements are forecast to add 500 daily riders to existing volumes; up to 3,500 total daily riders.

Travel time savings for each of the First Hill transit alternatives was evaluated for a forecast year of 2015. The 2015 Baseline condition was assumed to be a No-Build condition, with no changes in the corridors under study from 2005 existing conditions. Transit travel times for each of the alternatives were compared against local Metro bus transit travel times for the Baseline. Table 3 shows the relative travel times for each of the alternatives.

The 2015 total outbound travel times for the Broadway/Jackson Corridor alternatives from IDS to Capitol Hill Station are 16.5 and 15 minutes respectively for the streetcar and bus alternatives; inbound travel times from Capitol Hill Station to IDS are slightly shorter. The primary cause of slower streetcar run times and the difference between inbound and outbound travel time is the use of one-way operations via King Street instead of Jackson Street through the International District / Chinatown neighborhood. For this reason, it may be beneficial to reconsider double-tracking the streetcar alignment via Jackson Street or signalizing all intersections along King Street to provide faster service through this area. Extending streetcar service to Aloha Street on Capitol Hill would add about three minutes each direction. Projected streetcar travel times are just over twice as long as the trip will be to Capitol Hill Station on University Link or would

have been to central First Hill on the 1999 light rail alignment. Either project alternative in this corridor will save passengers substantial time, reducing projected in-vehicle times by roughly six minutes or 40 percent over existing local bus options and eliminating long transfers or walks for people making downtown connections at the intersection of 12th and Jackson (14 to 20 minutes on average). General purpose travel times and operations are expected to change by one minute or less, similar to no-build. Introduction of new transit service, streetcar or bus, in the Broadway/Jackson Corridor has substantial benefits for First Hill and connecting regional bus or commuter rail passengers.

Table 3: First Hill Transit Alternatives
2015 Travel Times (minutes) Relative[1] to First Hill Baseline Condition

Alternative	GP Traffic[2]	Streetcar[3]	Bus[3]
Broadway/Jackson Corridor Streetcar	> 1	< 4-5	N/A
Broadway/Jackson Bus Improvements	> 1	N/A	< 6-8
Madison Corridor Bus Improvements[4]			
Option 1 – Eastbound	> 0.5	N/A	< 0.5
– Westbound	> 5.5		No change
Option 2 – Eastbound	No change	N/A	No change
– Westbound	> 3.5		> 2.5
Option 2 (Optimized) – Eastbound	No change	N/A	< 0.5
– Westbound	> 0.5		< 0.5

[1] ">" indicates travel times greater than Baseline; "<" indicates travel times less than Baseline; e.g. ">1" indicates travel times with the alternative are 1 minute longer than in the Baseline.
[2] GP traffic is general purpose traffic – cars and trucks traveling in the general purpose lanes. GP travel times in the alternatives are compared to GP travel times in the Baseline.
[3] Streetcar or new bus service travel times in the alternatives are compared to local Metro bus travel times in the Baseline. Existing local bus service would also benefit from improvements in corridor.
[4] The travel time for the current Metro Transit Route 12, which runs on Marion Street, is used as a proxy for Baseline eastbound bus travel time on Madison Street west of 6th Avenue.

None of the Madison Corridor alternatives would improve transit travel times substantially relative to the Baseline. In fact, while small gains were found west of Interstate 5, all but one alternative worsened travel times in the westbound direction during the afternoon peak. That the Optimized Option 2 with a substantial length of transit signal priority was the only alternative with quantifiable time benefits westbound highlights the importance of looking at traffic on Madison in context with alternate routes and debating how much travel demand can be diverted or shifted to transit in this corridor. However the traffic analysis also shows that several features of the options studied would have clear benefits to transit: signal improvements at Boren Avenue and 9th Avenue, a downtown Madison Street contraflow lane, and consolidating bus stops. Other potentially beneficial elements are east-west signal priority and additional off-peak parking restrictions on First Hill. More frequent service would also improve ridership and enhance regional connections; the cost of going from 10 to 5 minute headways is included in the study alternatives.

Cost Summary

Table 4 shows the summary level cost estimates for each of the First Hill transit alternatives. These cost estimates reflect the entire project development cycle from project initiation through the start-up of revenue operations for each alternative. However, the estimates are based on conceptual engineering (five percent design completion), so they are subject to revision as design work proceeds on any given alternative. Currently, the cost estimates specifically exclude the following non-essential elements or potential cost increases to existing programs:

- Replacement of displaced on-street parking;
- Grade-separated pedestrian crossings;
- Utility undergrounding;
- Street / pavement type, sidewalk, lighting and utility upgrades or betterments not directly needed for bus or streetcar facilities and operations;
- Non-structural architectural and aesthetic elements in excess of the Sound Transit Art Program;
- Demolition of closed bus zones and other costs of stop consolidation;
- Bus maintenance base expansion for fleet additions;
- Central radio communications;
- Conversion of streetcar vehicles from pantograph to trolley poles;
- Additional signage at IDS or Capitol Hill light rail stations;
- Ticket vending machines or Smart Card readers; and
- Community development or other third-party funding.

Table 4: First Hill Transit Alternatives
Cost Summary (Range in Millions of 2005$)

	Broadway/Jackson Corridor			Madison Corridor Bus Improvements	
Cost Category	Streetcar[1]	Streetcar Ext.[2]	Bus Improvements	Option 1	Option 2
Agency Administration	6.4 - 7.4	1.2 - 1.4	0.8 - 0.9	1.2 - 1.4	1.2 - 1.4
Environmental Clearance and PE	3.0 - 3.5	0.5 - 0.6	0.5 - 0.6	0.8 - 0.9	0.8 - 1.0
Final Design, Specs, Permitting	7.6 - 8.7	1.3 - 1.5	0.5 - 0.6	0.8 - 0.9	0.8 - 1.0
ROW Acquisition	13.1 - 15.0	0.4 - 0.4	0.5 - 0.6	0.8 - 1.0	0.9 - 1.0
Construction	65.5 - 75.3	13.0 - 15.0	4.3 - 4.9	6.6 - 7.6	7.1 - 8.1
Vehicles	17.6 - 20.3	5.5 - 6.4	5.6 - 6.4	8.8 - 10.1	8.8 - 10.1
Contingency	6.0 - 6.9	1.5 - 1.7	1.1 - 1.3	1.8 - 2.1	1.8 - 2.1
Total [3]	119.2 - 137.1	23.5 - 27.1	13.4 -15.4	20.8 - 24.0	21.5 - 24.7
Annual Operating Cost	5.0	1.5	3.5	2.5	2.5

[1] The basic streetcar alternative would extend from IDS to Capitol Hill Station.
[2] The streetcar extension would add roughly ½ mile to the line from John Street north to Aloha Street.
[3] Cost estimates above provided in 2005 base year dollars; figures were escalated to a base year consistent with other ST2 package projects prior to ST Board consideration of the plan.

Environmental Summary

Table 5 presents relative ratings of the potential environmental impacts of each study alternative. This rating is based on a preliminary environmental screening that examined existing conditions and reviewed potential issues associated with each alternative. For the most part, potential impacts during construction and operation would occur immediately adjacent to or within one block of the proposed alignment. Benefits associated with the proposed improvements are not reflected in Table 5. However, the area of potential benefit from additional transit service and mobility improvements would be more broadly distributed across the project area than the impacts; to at least ¼ mile or walking distance of the transit improvements.

Table 5: First Hill Transit Alternatives
Environmental Evaluation

Potential Impact Rating 1 2 3 4 5 (Least Potential Impact – Most Potential Impact)	Potential Environmental Impacts								
	Parking Loss	Utility Relocation	Visual Impacts	Hazardous Materials	Historic Resources	Construction Noise	Traffic Disruptions[1]	Total	Average
Broadway/Jackson Corridor									
Streetcar	3	3	3	3	3	5	4	24	3.4
Bus Improvements	4	2	2	2	2	4	3	19	2.7
Madison Corridor									
Bus Improvement Option 1	5	2	2	2	2	3	3	19	2.7
Bus Improvement Option 2	5	2	2	2	2	4	4	21	3.0

[1] Traffic disruptions during construction.

For the potential environmental impacts identified above, each impact was analyzed specifically for streetcar and bus alternatives. The following explains the evaluation process for each impact category as well as a brief summary of results for streetcar and bus alternatives. None of the impacts were considered substantial enough to screen out an alternative from further study. Project level review would be required for any alternative selected to further evaluate impacts and define any necessary mitigation.

Parking Loss – Existing on-street parking and limited-stop loading spaces were counted. These numbers were revised based on the number of parking stalls that would be removed to accommodate either streetcar or bus improvements along each corridor. The Jackson/Broadway streetcar route could result in the loss of 144 on-street parking spaces while the corridor bus improvements could result in the loss of 180 on-street parking spaces. The higher parking loss with the bus alternative comes from using a southbound BAT lane on Broadway. Bus vehicles

have the flexibility of being able to pass areas of high congestion during the peak hours, while streetcar reliability would be negatively impacted by getting 'stuck' behind high volumes of right-turning vehicles headed to Interstate 5 or downtown in the afternoon. Madison Corridor bus improvements could result in the loss of 120 parking spaces and while this number is lower than in the Jackson/Broadway Corridor, it includes removal of all on-street parking along the corridor to allow for new lane configurations and roadway striping. The parking losses in all cases are all-day restrictions and are the primary source of travel time advantages over existing service; stop consolidation (combining two or more bus stops into one new stop location) also providing substantial time savings.

Utility Relocations – For each alternative, existing underground and overhead utility lines which could be encountered and potentially disrupted or relocated during construction were reviewed. The streetcar track construction requires building new tracks and it is assumed to use a different voltage of overhead power supply than existing electric bus services. The track construction introduces potential impacts to buried utility lines including stray current insulation concerns for major water lines along the route. Relocation has been assumed where tracks would run parallel and near to such water lines. While the potential bus related construction is relatively minor there is still a possibility of encountering buried utilities. All alternatives would increase electric power demand in the area and require different levels of traction power system upgrades.

Visual Impacts – Impacts related to visual aesthetics or quality within each corridor was reviewed. Examples of impacts included moving bus service closer to street-front business or housing, addition of new overhead power lines and poles, and removal or addition of buildings required for construction of a streetcar maintenance facility. The streetcar option includes the addition of two new overhead electrical lines (one over each track) and associated poles to power the streetcar vehicles. These additional utilities could increase visual impacts.

Hazardous Materials – Data on agency hazardous materials lists was reviewed to determine whether any known sites of hazardous materials or contaminated soils were located along the project routes. The potential for impacts for the streetcar option could be higher than for either bus option because of a greater opportunity for encountering hazardous materials during excavation for trackwork, possible water line relocation, and demolition of existing buildings for maintenance building construction.

Historic Resources – A review of historic structure records took place along the various routes. While some historic structures exist near each route, the projects would occur within street right-of-way and thus buildings would not be directly affected. The proposed projects would not greatly alter the existing setting, but further review would be required.

Construction Noise – Construction activities associated with each of the studied alternatives may result in noise increases along each project corridor. While noise and loud activities can disturb adjacent properties, some uses are generally more sensitive to noise increase than others including schools, hospitals, churches, libraries and some residential and business uses. The Jackson/Broadway Corridor includes several sensitive land uses which could potentially be affected by construction activities and noise. The streetcar alternative could have more opportunities for noise disturbances during construction associated with the excavation of the

street to install rails for streetcar vehicles, laying conduit for rider information communication lines and installation of overhead electrical lines. Proposed bus improvements in this corridor may not require extensive use of construction equipment. Along the Madison corridor, an abundance of noise-sensitive receptors would likely result in more potential noise disturbances than other areas. However, proposed bus improvements would not require extensive use of construction equipment.

Traffic Disruptions (during construction) – Existing travel conditions would be disrupted by construction activities in all three of the transit alternatives studied. Along the Jackson/Broadway corridor, traffic disruptions during construction would include delays and detours. Travel time increases would be expected and greatest during peak travel times. The streetcar option may result in greater disruptions in travel times because of construction activities associated with the need for new streetcar tracks. Because construction activities would occur over a longer period of time, lane closures and potential detours could be of longer durations. For any of the bus options, most construction activities would allow travel lanes to remain open thereby lessening local traffic impacts. Along Madison Street, travel times to local medical facilities could be affected.

Right of Way & Land Use – Only the streetcar alternative is expected to require acquisition of private property or any business displacements. The impacts include full parcels required for the proposed maintenance facility and storage tracks, partial acquisitions to accommodate right-turn movements, and a utility easement. Construction staging area leases may also be pursued by a contractor. Development of all alternatives evaluated is compatible from a land use perspective. Given the urban center and village designations along either corridor, improved transit service is a good fit.

Public Involvement Process

Sound Transit has undertaken an ongoing community outreach effort throughout the second phase of the First Hill Work Program. Building upon outreach conducted for the first phase of the work program in 2005, Sound Transit staff has continued individual and community briefings throughout the International District/Chinatown, First Hill, and Capitol Hill neighborhoods. The purpose of the briefings has been to share project information with residents and businesses and to notify them of upcoming Sound Transit Board action.

Staff proactively met with diverse groups throughout the potential project area to update them on the current planning status and alternatives under consideration, and to solicit feedback. This feedback was conveyed back to the planning team for consideration in development of alternatives. Approximately 20 briefings were provided during the course of conceptual engineering to groups such as the First Hill Improvement Association, First Hill Community Council, Capitol Hill Stewardship Council, Capitol Hill Retail Strategy Forum, Yesler Terrace Community Council, Chinatown/International District Business Improvement Area, International District Forum, and the Seattle Streetcar Alliance.

In addition to providing briefings, staff also held an open house on First Hill, which was attended by approximately 50 people in May 2006. The open house provided citizens with a chance to

view plans, ask questions, and submit comments, and it included a presentation on the First Hill alternatives. Partner agency staff also displayed information on the City of Seattle's South Lake Union Streetcar and King County Metro's Waterfront Streetcar projects at the open house.

Sound Transit produced a First Hill transit alternatives fact sheet that was sent to approximately 24,000 addresses throughout the potential project area announcing the open house. An additional 2000 copies of the fact sheet were distributed to community centers and other public facilities in advance of the open house. An electronic version of the fact sheet was distributed to Sound Transit's interested parties e-mail list. The fact sheet was also translated into four languages (Chinese, Tagalog, Korean and Vietnamese) for use at the open house and at specific briefings throughout the neighborhood. Two additional fact sheets were produced containing corridor-specific information. All materials and project information were posted on the Sound Transit website.

The majority opinion expressed during Sound Transit's outreach effort was one of positive support for development of a streetcar line to First Hill. People are largely in support of the route and interested in possible future extensions; strongly supporting a connection with a restored Waterfront Trolley service. There was discussion of whether alternative alignments to directly connect more destinations are feasible, and while some options exist they are not without additional property or travel time impacts. The City of Seattle's recent network planning effort continues to include the route proposed by Sound Transit as a top priority. Concerns about impacts focused on stop location, parking loss, impacts to general purpose traffic and construction timing. People involved in the process also strongly support bus transit improvements to First Hill, particularly if a streetcar line can not be built for a number of years.

Project Benefits

Regardless of the transit alternative selected, additional bus or streetcar transit serving First Hill would provide and enhance direct connections between the major urban centers of downtown Seattle, First Hill (with its major employers, residential, commercial and educational facilities) and Capitol Hill. It would also provide connections to the areas served both locally and regionally by the Link light rail system, Sounder commuter rail, Community Transit commuter bus service, ST Express regional bus service, King County Metro bus service and the Waterfront Streetcar. In addition, streetcar service or bus improvements (depending on the operational format of bus service) would also provide higher speed service with more limited stops than local bus service on current routes.

However, the recent surge of interest in streetcar service both nationally and locally reflects the fact that streetcars offer additional benefits not provided with increased bus service alone. The following section outlines some of the benefits First Hill streetcar service would provide relative to increased bus service.

Streetcar Benefits

Streetcar systems have several advantages over bus transit that make them more attractive to both riders and the communities they serve.

- *Simplicity of Use* - Even in a city like Seattle with a robust and excellent bus system, there are still some discretionary transit riders who avoid buses but who would ride a streetcar if it were available. Streetcars are more attractive than buses to occasional riders because of their fixed-route nature. Streetcar system maps remain fixed, and riders are confident they know where a streetcar will go. Bus system maps, on the other hand, are subject to change, and learning the system well enough to use it with confidence is often too large a hurdle for occasional riders.[1]

- *Rider Comfort* - with spacious interiors and more space per passenger; multiple, wide doors, low-floors that allow level boarding, and a smoother and quieter ride, streetcars often provide a higher level of comfort to the rider than buses.

- *Increased Capacity* – Streetcars can accommodate larger passenger loads and allow faster loading and unloading than typical buses. These characteristics result in greater capacity for streetcars than for buses. In this case, it is possible to purchase low-floor bus vehicles designed to appear more like a rail vehicle that when combined with fare payment changes would make this a less important difference between modes.

- *Public Support* – Streetcar systems generally generate higher public and voter support than bus improvements alone.

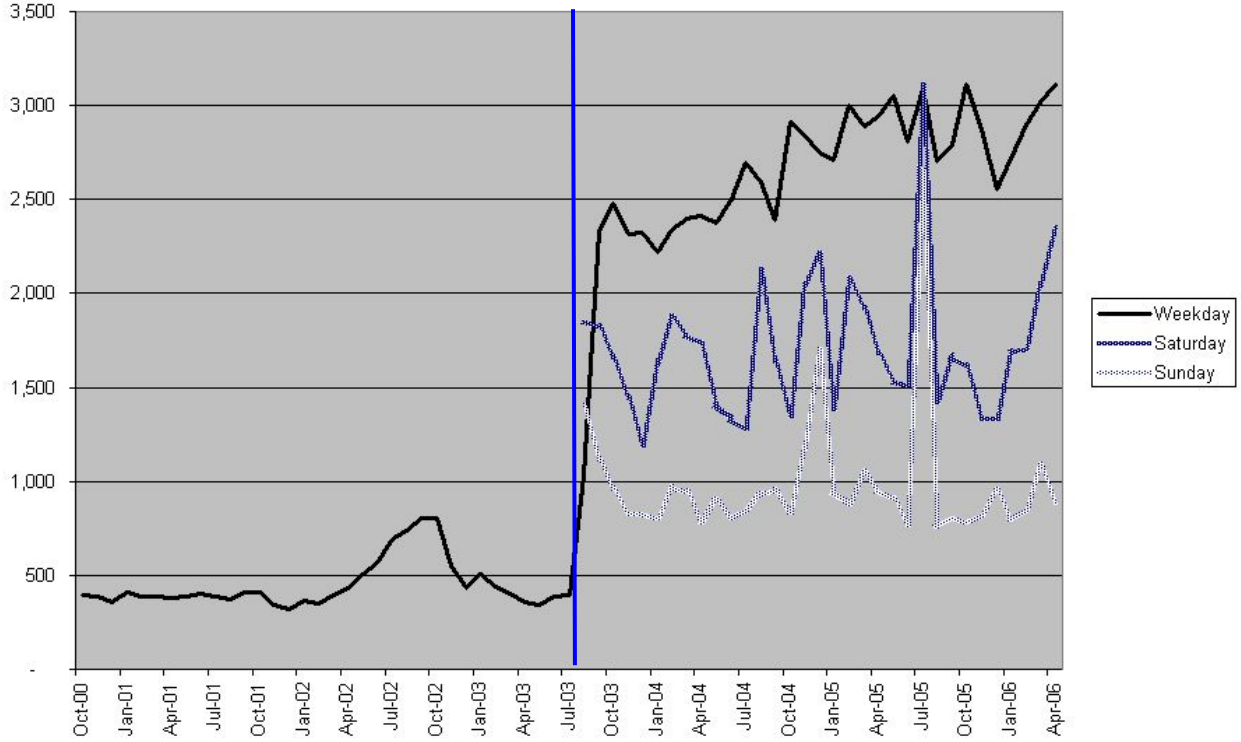
- *Ridership Advantage/Desirability of Use* – As noted above, streetcar systems have several advantages over bus transit that make them more attractive to riders. One local example can be found in the City of Tacoma. The Tacoma Link light rail line between the downtown Theater District and the Tacoma Dome Station replaced a Downtown Connector bus service that previously operated on Pacific Avenue/South 25th Street in the same market. The Downtown Connector was a free, peak-hour weekday shuttle that operated every 12 minutes. During summer 2002, midday service was added to the Downtown Connector during Tacoma Link construction.

  In August 2003, Tacoma Link opened as a free, 1.7 mile long all-day service operating at a frequency of 10 minutes on weekdays. The truest comparison of ridership on the two services is between the summer of 2002 and the same period subsequent to the Link system's opening in August 2003. Even accounting for the slightly improved service level, the opening of rail service clearly and dramatically increased transit ridership, with data showing a 500 percent improvement.

[1] Litman, Todd; "Rail Transit in America: A Comprehensive Evaluation of Benefits", Victoria Transport Policy Institute, 8-31-2006.

Figure 2 shows a comparison of average daily boardings on the Downtown Connector (bus service) which operated until August 2003 and the subsequent Tacoma Link (streetcar service) which replaced the Downtown Connector bus in August 2003.

Figure 2: Downtown Connector Bus Service/Tacoma Link - Average Daily Boardings



Data from other systems also demonstrates clear ridership gains on rail services that replace bus alternatives. In San Francisco, there was a three-fold increase. In Toronto, improvements were notable though less dramatic at 15 to 25 percent higher than nearly identical bus lines. The free bus route currently replacing King County's Waterfront Trolley service in Seattle is also capturing fewer riders, particularly discretionary riders on weekends, than the historic streetcar line. An average estimate suggested by the City of Seattle for the added draw of streetcar services is 15 to 50 percent.[2]

- *Economic Development* - Cities around the country where streetcar systems have been built have reported positive economic development benefits and positive land use impacts as a result. The streetcar system is often cited as a catalyst for desired changes.

  Developers are attracted by the same advantages of streetcar systems that attract riders. First, developers recognize that streetcars will attract higher ridership than buses, providing an effective transportation alternative for potential residents, employees, or customers. Second, the fixed-route nature of streetcars provides developers with assurance that the streetcar

[2]Parsons Brinckerhoff in association with Nelson Nygaard Associates and URS Corporation; "Seattle Streetcar Network and Feasibility Analysis", Seattle Department of Transportation, June 30, 2004.

transit option will be around indefinitely, unlike bus routes, which are subject to periodic changes.

In this case, the project is proposed to include removal of on-street parking which is a controversial tradeoff for retailers. Studies from other cities have shown 10 to 60 percent increases in retail activity for hotel and retail businesses served by at-grade rail lines. Other interviews suggest that the gains experienced after implementation of new rail service, especially those with the highest level of priority or segregation from auto traffic, are so obvious that there is no need for formal evaluations and consequently few are actually commissioned.[3]

Successful implementation of streetcars is associated with redevelopment of central urban areas that were formerly in decline or underutilized. The streetcar service tends to leverage compact development patterns and besides providing good accessibility to other destinations brings new people to the area and becomes associated with improved livability for residents. The Seattle urban centers in consideration for this study already feature many transit oriented development characteristics but would likely benefit from the additional attractiveness of a streetcar line.

The City of Portland has undertaken a thorough assessment of the development effects of its streetcar system, which found that properties nearest to the streetcar line experienced the greatest amount of development. This is a good comparison to the proposed First Hill service in Seattle since Portland's line operates in mixed traffic at relatively low speeds yet still served as a strong catalyst for vigorous retail and housing in-fill development close to the downtown core.

The Portland Streetcar system opened on July 20, 2001 along an alignment that had been identified in 1997. A study conducted for the City in 2005 concluded that, "Properties located closest to the streetcar line have experienced the largest share of development – and at Floor Area Ratios (FARs) that more closely approach the properties' zoned density potential – than properties situated further from the streetcar alignment."[4]

Figure 3 shows the percentage of allowable FAR realized for new projects in the Portland Central Business District (CBD) versus distance from the streetcar alignment. Prior to 1997, new CBD projects were built to less than half of the allowable density. Since 1997, however, new CBD projects have achieved an average of 90% of the allowable density within one block of the streetcar alignment, dropping to 43% at three or more blocks from the alignment.

[3] Gormick, Greg; "The Streetcar Renaissance: Its Background and Benefits", St. Clair Avenue Transit Improvements Environmental Assessment Study, On Track Consulting, 2004.
[4] E. D. Hovee & Company; "Portland Streetcar Development Impacts", Portland Streetcar Inc., October 2005.

Figure 3: Percentage of New CBD Development vs. Distance from Streetcar Alignment

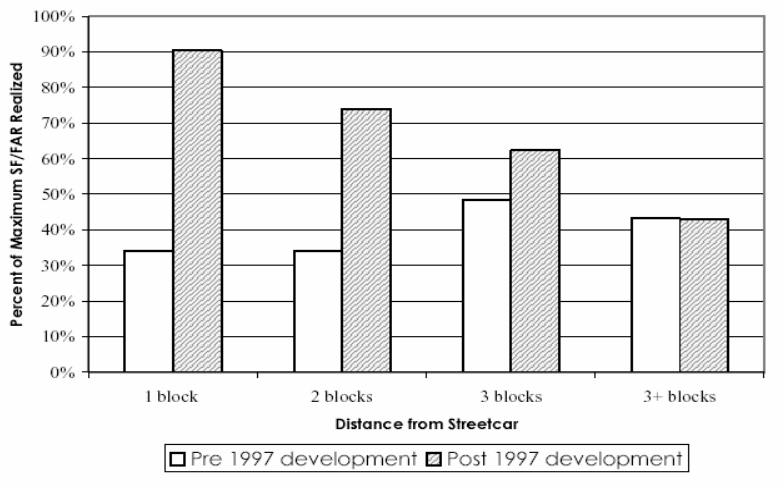


Figure 4 shows the percentage of new CBD development versus distance from the streetcar alignment. Prior to 1997, land located within one block of the streetcar alignment captured 19% of all new development. Since 1997, however, 55% of all new development in the CBD has occurred within one block of the alignment.

Figure 4: Percentage of New CBD Development vs. Distance from Streetcar Alignment